



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Supplemental Appeal Brief Transmittal

In re application of: Miller, *et al.*

Serial No.: 09/421,585

Filed on: 10/20/99

For: **APPARATUS AND METHOD FOR PASSIVELY MONITORING LIVENESS OF JOBS IN A CLUSTERED COMPUTING ENVIRONMENT**

Mail Stop APPEAL BRIEF - PATENT

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Sir:

Appellant hereby requests reinstatement of the appeal. Transmitted herewith for filing is a **Supplemental Appeal Brief** in triplicate for the above-identified Application.

- ☒ Please deduct \$500.00 from Deposit Account No. 09-0465 for IBM Corporation to cover the fee under 37 C.F.R. §1.17(f) for the filing of the enclosed Supplemental Appeal Brief. A duplicate copy of this sheet is enclosed.
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Respectfully submitted,

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I HEREBY CERTIFY THAT THE CORRESPONDENCE TO WHICH THIS STATEMENT IS AFFIXED IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE, POSTAGE PAID, AS FIRST CLASS MAIL IN AN ENVELOPE ADDRESSED TO: MAIL STOP APPEAL BRIEF - PATENT, COMMISSIONER FOR PATENTS, P.O. BOX 1450, ALEXANDRIA, VA 22313-1450.

Date: February 4, 2005

By: 



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Miller, *et al.* Docket No.: RO999-057
Serial No.: 09/421,585 Group Art Unit: 2126
Filed: 10/20/99 Examiner: OPIE, GEORGE L.
For: APPARATUS AND METHOD FOR PASSIVELY MONITORING LIVENESS OF
JOBS IN A CLUSTERED COMPUTING ENVIRONMENT

SUPPLEMENTAL APPEAL BRIEF

Mail Stop APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

Appellant hereby requests reinstatement of the appeal. This appeal is taken from the Examiner's non-final rejection, set forth in the Office Action dated 11/05/04, of appellant's claims 1-26, which was sent in response to appellant's appeal brief that was filed on 07/21/04.

REAL PARTY IN INTEREST

International Business Machines Corporation is the Real Party in Interest.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences for this patent application.

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STATUS OF CLAIMS

As filed, this case included claims 1-26. In response to the first office action dated 09/03/03, an Amendment was filed on 12/02/03 that amended claim 7. In a final rejection dated 02/25/04, claims 1-26 were rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,108,699 to Moiin. The rejection was appealed, with an Appeal Brief filed 07/21/04. In response to the Appeal Brief, prosecution was reopened with a new non-final action dated 11/05/04. In this most recent rejection, claims 1-26 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,108,699 to Moiin in view of U.S. Patent No. 6,430,591 to Goddard. The claims remaining in the case are claims 1-26, all of which stand rejected. No claim has been allowed.

STATUS OF AMENDMENTS

The amendment filed on 12/02/03 has been entered. Therefore, the claims at issue in this appeal are the claims as amended by the amendment filed 12/02/03.

SUMMARY OF INVENTION

An apparatus and method passively determine when a job in a clustered computing environment is dead. Each node in the cluster has a cluster engine for communicating between jobs within the same group on other nodes. A protocol is defined that includes one or more acknowledge (ACK) rounds, and that only performs local processing between ACK rounds. The protocol is executed by jobs that are members of a defined group. Each job in the group has one or more work threads that execute the protocol. In addition, each job has a main thread that communicates between the job and jobs on other nodes (through the cluster engine), routes appropriate messages from the cluster engine to a work thread, and signals to the cluster engine when a fault

occurs when the work thread executes the protocol. By assuring that a dead job is reported to other members of the group, liveness information for group members can be monitored without the overhead associated with active liveness checking.

ISSUE

The following single issue is presented for review on this Appeal:

- 1. Whether claims 1-26 are obvious under 35 U.S.C. §103(a) over Moiin in view of Goddard.**

GROUPING OF CLAIMS

Claims 1 and 16-18 are grouped, and stand or fall together based on claim 1. Claims 2 and 19 are grouped, and stand or fall together based on claim 2. Claims 3 and 20 are grouped, and stand or fall together based on claim 3. Claims 4 and 21 are grouped, and stand or fall together based on claim 4. Claims 5 and 22 are grouped, and stand or fall together based on claim 5. Claims 6 and 23 are grouped, and stand or fall together based on claim 6. Claims 24-26 are grouped, and stand or fall together based on claim 24. It is appellant's intention that the patentability, *vel non*, of claims 7-15 be considered independently, as these claims do not stand or fall with any other claim. This grouping of claims is appropriate because each set of claims includes a unique combination of limitations not found in the other sets of claims, and because the claims that are not grouped with any other claim include a unique combination of limitations not found in any of the groups or claims.

ARGUMENT

**Issue 1: Whether claims 1-26 are unpatentable under 35 U.S.C. §103(a)
over Moiin in view of Goddard**

Claim 1

In the most recent Office Action dated 11/05/04, the Examiner rejected claims 1-26 under 35 U.S.C. §103(a) as being unpatentable over Moiin in view of Goddard. In rejecting claim 1, the Examiner continues with much of the same reasoning from the previously appealed office action regarding Moiin. Specifically, the Examiner reads “applications which execute in any member node of current cluster” in Moiin on the job recited in the claim. A very cursory examination of the claim and of the teachings of Moiin show this mapping does not make sense. A job in claim 1 includes at least one work thread and a main thread. The applications in Moiin may call threads, but do not “include” threads. In Moiin, the “command reader thread 1008 acts as a remote procedure calling (RPC) server for applications which execute in any member node” (page 13, line 35). A job in claim 1 is a process that includes multiple threads, while the applications in Moiin are software applications, which do not *include* threads but merely make calls to them. For this reason, the applications in Moiin do not read on the job in claim 1.

The Examiner suggests Moiin teaches the claim limitation “that signals to the cluster engine when at least one fault occurs when the at least one work thread performs the at least one predefined task”, citing “messages which indicate to CMM 220A which of the other nodes are operative”. The Examiner has read a communication between nodes in Moiin on the function recited in claim 1 that occurs between threads on a single node. In claim 1, the main thread signals to the cluster engine in the main thread’s node when at least one fault occurs when the at least one work thread performs the at least one

predefined task. This communication all happens on the same node. The main thread thus monitors the progress of the at least one work thread, and signals to the cluster engine when a fault occurs. The passing of messages between nodes to indicate which nodes are operative has nothing to do with this function recited in claim 1. Because Moiin and Goddard do not teach or suggest a main thread that signals to the cluster engine when at least one fault occurs when the at least one work thread performs the at least one predefined task, claim 1 is allowable over Moiin in view of Goddard.

The Examiner then suggests that Goddard teaches “at least one work thread that signals when at least one fault occurs when the at least one work thread performs the at least one predefined task” in claim 1 by stating: “(code executed in the worker thread must take steps to return synchronization messages to the correct binding thread)”. The Examiner’s reasoning seems to equate the synchronization message between the worker thread and binding thread in Goddard with the messages from the main thread to the cluster engine that is routed when at least one fault occurs. There is no discussion by the Examiner why a synchronization message is equivalent to a message signaling when a fault occurs. This limitation of the claim, message signaling when a fault occurs, is not addressed by the Examiner. The very term “synchronization message” implies the communication of timing information, not signaling when at least one fault occurs.

Further, the mapping of the cited art and claim 1 in the previous paragraph is also defective for another reason. When the Examiner suggests that Goddard teaches “at least one work thread that signals when at least one fault occurs when the at least one work thread performs the at least one predefined task” in claim 1 by stating: “(code executed in the **worker thread must take steps to return** synchronization messages to the correct binding thread)”, the direction of the signaling between threads in the cited art is in the opposite direction to the signaling in claim 1. In Goddard, the signaling referenced by the examiner is from the work thread to the binding thread (main thread) as indicated by the

bolded section above. In contrast, in claim 1 the main thread signals to the cluster engine when at least one fault occurs when the at least one work thread performs the at least one predefined task. The cited language in Goddard that relates to communication from a work thread to a main thread cannot be properly read on the signaling by the main thread to the cluster engine, as recited in claim 1. For this reason, claim 1 is allowable over the combination of Moiin and Goddard.

The Examiner's rejection of claim 1 is defective for yet another reason. The Examiner appears to map the CMM 220A of Moiin on the cluster engine in claim 1. Then the Examiner cited to Goddard for the teachings of the main thread in claim 1. The Examiner found the main thread in Goddard, and the cluster engine in Moiin. Therefore, this mapping of claim 1 assumes that it would be obvious for the main thread of Goddard to signal the CMM of Moiin. The Examiner has not given a rationale why one of ordinary skill in the art would find it obvious for the main thread of Goddard to communicate with the CMM in Moiin. As a result, the Examiner has failed to establish a prima facie case of obviousness for claim 1 under 35 U.S.C. §103(a).

Even if the Examiner's combination were to teach the claimed invention, the Examiner's motivation to combine the cited references is defective. The Examiner's stated motivation to combine Moiin and Goddard is the "threading of the job provides mechanisms for efficiently performing and synchronizing the discrete components/operations requisite in the task execution and management." This stated motivation to combine was not given a reference by the Examiner and was not found in the cited art by the Appellant. The Examiner has summarized the teaching of the cited art (apparently of Goddard) in a manner that is broader than its express teachings. It appears the Examiner has used hindsight and the Appellant's claimed invention to characterize the cited art. Further, even if the cited art does make such a statement, this teaching does not suggest to combine the art as suggested by the Examiner. The claimed invention is more than a simple combination of the cited art. The cited art does not teach or suggest

the elements as described above with reference to claim 1, and below with reference to the other claims.

For the many reasons given above, appellant respectfully asserts that claim 1 is allowable over Moiin in view of Goddard, and respectfully requests that the Examiner's rejection of claim 1 under 35 U.S.C. §103(a) be reversed.

Claims 16-18

Claims 16-18 are grouped with claim 1, and stand or fall according to the allowability of claim 1.

Claim 2

The arguments above with respect to claim 1 apply equally to claim 2, and are incorporated in this section by reference. In rejecting claim 2, the Examiner states: "As to claim 2, Moiin (p6 12-30) teaches a protocol that includes at least one acknowledge round (each member node of a cluster responds to a reconfiguration message . . . by broadcasting a responding reconfiguration message)." Appellant admits that Moiin teaches a sort of communication protocol where each member node of a cluster responds to a reconfiguration message by broadcasting a responding reconfiguration message. Note, however, that claim 2 expressly recites "wherein the at least one predefined task comprises a protocol that includes at least one acknowledge (ACK) round, and that performs only local processing between ACK rounds." The Examiner's rejection of claim 2 fails for two reasons. First, the communication protocol cited by the Examiner in Moiin in rejecting claim 2 is not defined by the at least one predefined task, as recited in claim 2. Second, the Examiner has utterly failed to address the limitation "and that performs only local processing between ACK rounds" in claim 2. As a result, the Examiner has failed to establish a prima facie case of obviousness for claim 2 under 35

U.S.C. §103(a). Claim 2 is directed to the specifics of the at least one predefined task. By including at least one ACK round and performing only local processing between ACK rounds, the invention in claim 2 assures that a work thread cannot get stuck between ACK rounds. Neither Moiin nor Goddard have any such teaching or suggestion. Appellant respectfully asserts that claim 2 is allowable over the combination of Moiin and Goddard. In addition, claim 2 depends on claim 1, which is allowable for the reasons given above. As a result, claim 2 is allowable as depending on an allowable independent claim. Appellant respectfully requests that the Examiner's rejection of claim 2 under 35 U.S.C. §103(a) be reversed.

Claim 19

Claim 19 is grouped with claim 2, and stands or falls according to the allowability of claim 2.

Claims 3-4

The arguments above with respect to claim 1 apply equally to claims 3-4, and are incorporated in this section by reference. In rejecting claims 3-4, the Examiner states: "As to claims 3-4, Moiin (p.13 24-57) teaches the main thread performs only local processing sans waiting for local resources." However, a careful study of Moiin reveals that the language in Moiin cited by the Examiner has no teaching or suggestion that reads on the limitations in claims 3-4. The Examiner has not mapped any of the teachings of Moiin on the limitations in claims 3-4. Because the Examiner has not specifically identified what teachings in Moiin allegedly read on the limitations in claims 3-4, the Examiner has failed to establish a prima facie case of obviousness for claims 3-4 under 35 U.S.C. §103(a). Nowhere does Moiin teach or suggest that the main thread performs only local processing. For this reason, claim 3 is allowable over Moiin. Nowhere does Moiin teach or suggest that the main thread does not wait for any local resource, and thus

is guaranteed to receive a message sent by the cluster engine. For this reason, claim 4 is allowable over Moiin. In addition, claims 3-4 depend on claim 1, which is allowable for the reasons given above. As a result, claims 3-4 are allowable as depending on an allowable independent claim. Appellant respectfully requests that the Examiner's rejection of claims 3-4 under 35 U.S.C. §103(a) be reversed.

Claim 20

Claim 20 is grouped with claim 3, and stands or falls according to the allowability of claim 3.

Claim 21

Claim 21 is grouped with claim 4, and stands or falls according to the allowability of claim 4.

Claims 5-6

The arguments above with respect to claim 1 apply equally to claims 5-6, and are incorporated in this section by reference. In rejecting claims 5-6, the Examiner cites to Moiin at p9 line 51 to p10 line 7. This language in Moiin discusses one or more nodes leaving the cluster, but does not teach the specifics of how this is done. Claim 5 recites an unregistration with the cluster engine. Nowhere does Moiin teach the registration or unregistration with the cluster engine as a way to join or leave a cluster. Claim 6 recites that the unregistration with the cluster engine causes the cluster engine to generate a membership change message. Nowhere does Moiin teach the generation of a membership change message in response to an unregistration with the cluster engine. Because Moiin does not teach the specifics of how nodes leave a cluster, Moiin cannot teach the specific mechanisms in claims 5-6. Appellant respectfully asserts that claims 5-

6 are allowable over Moiin. In addition, claims 5-6 depend on claim 1, which is allowable for the reasons given above. As a result, claims 5-6 are allowable as depending on an allowable independent claim. Appellant respectfully requests that the Examiner's rejection of claims 5-6 under 35 U.S.C. §103(a) be reversed.

Claim 22

Claim 22 is grouped with claim 5, and stands or falls according to the allowability of claim 5.

Claim 23

Claim 23 is grouped with claim 6, and stands or falls according to the allowability of claim 6.

Claim 7

The arguments above with respect to claims 1-2 and 5-6 apply equally to claim 7, and are incorporated in this section by reference. In rejecting claim 7, the Examiner states: "As to claim 7, see the discussions of claims 1-2 and 6 supra. The limitations in claim 7 are an amalgamation of the features recited in claims 1-2 and 6. Hence, Moiin's teachings regarding claims 1-2 and 6 are similarly applied to the corresponding claim 7 limitations." Appellant respectfully asserts that the Examiner has failed to establish a prima facie case of obviousness under 35 U.S.C. §103(a) for claim 7.

Claim 7 recites limitations that are not found in any of claims 1-2 or 6. Claim 7 recites a cluster of computer systems that each includes the limitations in lines 3-21 of claim 7. None of claims 1-2 or 6 contain the limitation of such a cluster. In addition, claim 7 recites a network interface at lines 3-4 that is not addressed in any of claims 1-2

or 6. As a result, the Examiner has failed to establish a prima facie case of obviousness for claim 7 under 35 U.S.C. §103(a). In addition, claim 7 contains many of the limitations addressed above in claims 1-2 and 5-6 that patentably distinguish over Moiin and Goddard. As a result, claim 7 is allowable over Moiin in view of Goddard for the same reasons given above with respect to claims 1-2 and 5-6. Appellant respectfully requests that the Examiner's rejection of claim 7 under 35 U.S.C. §103(a) be reversed.

Claim 8

The arguments above with respect to claims 1 and 7 apply equally to claim 8, and are incorporated in this section by reference. The Examiner summarily rejects all of claims 8-14 by stating:

As to claims 8-14, note the rejections of claims 1-7 above. Claims 8-14 are the same as claims 1-7, except claims 8-14 are method claims and claims 1-7 are apparatus claims.

While claims 8-14 include many limitations that are also in claims 1-7, this fact does not excuse the Examiner from addressing all of the limitations in claims 8-14. For example, claim 8 recites the steps of "defining a task." The Examiner has not indicated what teachings in Moiin or Goddard read on this method step. Claim 8 also recites "providing at least one work thread for each job that executes the task." Appellant has not found where Moiin or Goddard teach providing a work thread for each job that executes a task. Because the Examiner has failed to address the specific method claim steps recited in claims 8-14, the Examiner has failed to establish a prima facie case of obviousness for claims 8-14 under 35 U.S.C. §103(a). Claim 8 does include many limitations that are common to claims 1-7, and is therefore allowable for the reasons given above with respect to claims 1-7. Appellant respectfully requests that the Examiner's rejection of claim 8 under 35 U.S.C. §103(a) be reversed.

Claim 9

The arguments above with respect to claims 1, 2, 7 and 8 apply equally to claim 9, and are incorporated in this section by reference. Claim 9 depends on claim 8. Because the Examiner failed to establish a prima facie case of obviousness for claim 8 by failing to address all of the limitations in claim 8, the Examiner has likewise failed to establish a prima facie case of anticipation for claim 9 because claim 9 depends on claim 8. In addition, claim 9 includes limitations similar to those found in claim 2, and is therefore allowable for the reasons given above with respect to claim 2. Appellant respectfully requests that the Examiner's rejection of claim 9 under 35 U.S.C. §103(a) be reversed.

Claim 10

The arguments above with respect to claims 1, 3, 7 and 8 apply equally to claim 10, and are incorporated in this section by reference. Claim 10 depends on claim 8. Because the Examiner failed to establish a prima facie case of obviousness for claim 8 by failing to address all of the limitations in claim 8, the Examiner has likewise failed to establish a prima facie case for claim 10 because claim 10 depends on claim 8. In addition, claim 10 includes limitations similar to those found in claim 3, and is therefore allowable for the reasons given above with respect to claim 3. Appellant respectfully requests that the Examiner's rejection of claim 10 under 35 U.S.C. §103(a) be reversed.

Claim 11

The arguments above with respect to claims 1, 4, 7 and 8 apply equally to claim 11, and are incorporated in this section by reference. Claim 11 depends on claim 8. Because the Examiner failed to establish a prima facie case of obviousness for claim 8 by failing to address all of the limitations in claim 8, the Examiner has likewise failed to

establish a prima facie case for claim 11 because claim 11 depends on claim 8. In addition, claim 11 includes limitations similar to those found in claim 4, and is therefore allowable for the reasons given above with respect to claim 4. Appellant respectfully requests that the Examiner's rejection of claim 11 under 35 U.S.C. §103(a) be reversed.

Claim 12

The arguments above with respect to claims 1, 5, 7 and 8 apply equally to claim 12, and are incorporated in this section by reference. Claim 12 depends on claim 8. Because the Examiner failed to establish a prima facie case of obviousness for claim 8 by failing to address all of the limitations in claim 8, the Examiner has likewise failed to establish a prima facie case for claim 12 because claim 12 depends on claim 8. In addition, claim 12 includes limitations similar to those found in claim 5, and is therefore allowable for the reasons given above with respect to claim 5. Appellant respectfully requests that the Examiner's rejection of claim 12 under 35 U.S.C. §103(a) be reversed.

Claim 13

The arguments above with respect to claims 1, and 6-8 apply equally to claim 13, and are incorporated in this section by reference. Claim 13 depends on claim 12, which depends on claim 8. Because the Examiner failed to establish a prima facie case of obviousness for claim 8 by failing to address all of the limitations in claim 8, the Examiner has likewise failed to establish a prima facie case for claim 13 because claim 13 depends on claim 8. In addition, claim 13 includes limitations similar to those found in claim 6, and is therefore allowable for the reasons given above with respect to claim 6. Appellant respectfully requests that the Examiner's rejection of claim 13 under 35 U.S.C. §103(a) be reversed.

Claim 14

The arguments above with respect to claims 1-8 apply equally to claim 14, and are incorporated in this section by reference. Claim 14 includes many method steps that are not taught in the apparatus claims. For example, claim 14 includes the limitation at lines 4-5 of:

defining a protocol that includes at least one acknowledge (ACK) round, and that performs only local processing between ACK rounds;

The Examiner's rejection of claim 14 relies upon the rejection of claim 7. However, the rejection of claim 7 does not address this specific method step. Claim 14 also recites:

wherein the main thread performs only local processing and does not wait for any local resource, and thus is guaranteed to receive a message sent by the cluster engine;

The Examiner's rejection of claim 14 relies upon the rejection of claim 7. However, the rejection of claim 7 does not address these limitations. Claim 14 also recites:

unregistering with the cluster engine when at least one fault occurs during execution of the protocol.

The Examiner's rejection of claims 1-7 does not address this specific method step. We see from these three simple examples above that the Examiner has not addressed all of the limitations in claim 14, and has therefore failed to establish a prima facie case of obviousness for claim 14 under 35 U.S.C. §103(a).

The rejection of claims 5-6 vaguely addresses reconfiguration of a cluster in Moiin "to form a new cluster which does not include any failed nodes." However, Moiin does not teach unregistering with the cluster engine *when at least one fault occurs during the execution of the protocol*, as recited in claim 14. For this reason, claim 14 is

allowable over Moiin. In addition, there are many limitations in claim 14 that are similar to those recited in claims 1-13. As a result, claim 14 is allowable for the reasons given above with respect to claims 1-13. Appellant respectfully requests that the Examiner's rejection of claim 14 under 35 U.S.C. §103(a) be reversed.

Claim 15

In rejecting claim 15, the Examiner relies upon the rejection of claim 6. Note, however, that claim 15 includes the limitations of claim 14 upon which it depends, and the limitations in claim 14 were not addressed by the Examiner. As a result, the Examiner has failed to establish a prima facie case of obviousness for claim 15 under 35 U.S.C. §103(a). Appellant respectfully asserts that Moiin in view of Goddard does not teach the unique combination of features in claim 15, and requests that the Examiner's rejection of claim 15 under 35 U.S.C. §103(a) be reversed.

Claim 24

In rejecting claim 24, the Examiner states that claim 24 is the same as claim 1, except claim 24 is a computer program product claim and claim 1 is an apparatus claim. This statement is incorrect. Claim 24 contains limitations not found in claim 1. For example, claim 24 recites that the protocol only performs local tasks between ACK rounds. Claim 24 also recites unregistering with the cluster engine, which causes the cluster engine to generate a membership change to remaining members of the group. Because these limitations are not found in claim 1, the Examiner's reliance upon claim 1 in rejecting claim 24 results in the Examiner failing to establish a prima facie case of obviousness for claim 24 under 35 U.S.C. §103(a). Claim 24 contains many of the limitations addressed above in claims 1-2 and 5-6 that patentably distinguish over Moiin in view of Goddard. As a result, claim 24 is allowable over Moiin in view of Goddard for

the same reasons given above with respect to claims 1-2 and 5-6. Appellant respectfully requests that the Examiner's rejection of claim 24 under 35 U.S.C. §103(a) be reversed.

Claims 25-26

Claims 25 and 26 are grouped with claim 24, and stand or fall according to the allowability of claim 24.

General Comments

In claim 1, which is representative of the broadest claims, there are many limitations that are not taught in the combination of Moiin and Goddard. The combination does not teach or suggest a job that includes at least one work thread and a main thread. The combination does not teach or suggest that the work thread performs at least one predefined task. The combination does not teach or suggest that the main thread receives messages, routes messages to the work thread(s), and signals to the cluster engine when a fault occurs when the work thread performs the predefined task. As a result, the claims are all allowable over the cited art for the many reasons discussed in detail above.

The Examiner's claim rejections are based upon text printouts of the Moiin and Goddard patents, citing page numbers and line numbers. These text versions of Moiin and Goddard make it impossible to determine from a standard printed patent what portions of Moiin and Goddard the Examiner is referring to when citing page numbers and line numbers of the text printout. Because the line numbers in the text printout are not numbered, the Examiner's reference to page numbers and line numbers of the text printout forces the reader to manually count lines to determine which portions of Moiin and Goddard the Examiner is referring to. This is a silly exercise given the clearly-marked column and line numbers in the printed patent. Appellant requests the Board to


instruct the Examiner to use the standard column and line number references to the printed patent in future office actions. This will allow anyone who needs to review the office action to refer to the standard printed patent, rather than having to retrieve the text version in the file wrapper.

CONCLUSION

Claims 1-26 are addressed in this Appeal. For the numerous reasons articulated above, appellant maintains that the rejection of claims 1-26 under 35 U.S.C. § 103(a) is erroneous.

Appellant respectfully submits that this Supplemental Appeal Brief fully responds to, and successfully contravenes, every ground of rejection and respectfully requests that the final rejection be reversed and that all claims in the subject patent application be found allowable.

Respectfully submitted,

A handwritten signature in black ink, reading "Derek P. Martin", written over a horizontal line.

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APPENDIX - CLAIMS FINALLY REJECTED

- 1 1. An apparatus comprising:
 - 2 at least one processor;
 - 3 a memory coupled to the at least one processor;
 - 4 a cluster engine residing in the memory and executed by the at least one
 - 5 processor;
 - 6 a job residing in the memory and executed by the at least one processor, the job
 - 7 including:
 - 8 at least one work thread that performs at least one predefined task; and
 - 9 a main thread that receives messages from at least one computer system
 - 10 coupled to the apparatus, that routes appropriate messages from the at least one
 - 11 computer system to the at least one work thread, and that signals to the cluster
 - 12 engine when at least one fault occurs when the at least one work thread performs
 - 13 the at least one predefined task.
- 1 2. The apparatus of claim 1 wherein the at least one predefined task comprises a protocol
- 2 that includes at least one acknowledge (ACK) round, and that performs only local
- 3 processing between ACK rounds.
- 1 3. The apparatus of claim 1 wherein the main thread performs only local processing.
- 1 4. The apparatus of claim 1 wherein the main thread does not wait for any local resource,
- 2 and thus is guaranteed to receive a message sent by the cluster engine.
- 1 5. The apparatus of claim 1 wherein the signal to the cluster engine comprises an
- 2 unregistration with the cluster engine

1 6. The apparatus of claim 5 wherein the unregistration with the cluster engine causes the
2 cluster engine to generate a membership change message.

1 7. A networked computer system comprising:
2 a cluster of computer systems that each includes:
3 a network interface that couples each computer system via a network to
4 other computer systems in the cluster;
5 at least one processor;
6 a memory coupled to the at least one processor;
7 a cluster engine residing in the memory and executed by the at least one
8 processor;
9 a job residing in the memory and executed by the at least one processor,
10 the job including:
11 at least one work thread that executes a predefined protocol that
12 includes at least one acknowledge (ACK) round, wherein the protocol only
13 performs local tasks between ACK rounds; and
14 a main thread that registers with the cluster engine to become a
15 member of a group, that receives messages from at least one computer
16 system coupled to the apparatus, that routes appropriate messages from the
17 at least one computer system to the at least one work thread, and that
18 signals to the cluster engine when at least one fault occurs when the at
19 least one work thread performs the at least one predefined task by
20 unregistering with the cluster engine, wherein unregistering with the
21 cluster engine causes the cluster engine to generate a membership change
22 to remaining members of the group.

1 8. A computer-implemented method for notifying jobs that form a group in a clustered
2 computing environment when a member of the group is no longer alive, the method
3 comprising the steps of:
4 defining a task;
5 providing a cluster engine for each member of the group that communicates with
6 the other cluster engines in the group;
7 providing at least one work thread for each job that executes the task;
8 providing a main thread for each job, the main thread performing the steps of:
9 receiving messages from other members of the group via the cluster engine
10 corresponding to the main thread;
11 routing appropriate messages from the other members of the group to the
12 at least one work thread; and
13 signaling to the cluster engine when at least one fault occurs during the
14 execution of the task by the work thread.

1 9. The method of claim 8 wherein the task comprises a protocol that includes at least one
2 acknowledge (ACK) round, and that performs only local processing between ACK
3 rounds.

1 10. The method of claim 8 wherein the main thread performs only local processing.

1 11. The method of claim 8 wherein the main thread does not wait for any local resource,
2 and thus is guaranteed to receive a message sent by the cluster engine.

1 12. The method of claim 8 wherein the step of signaling to the cluster engine comprises
2 the step of unregistering with the cluster engine.

1 13. The method of claim 12 wherein the step of unregistering with the cluster engine
2 causes the cluster engine to generate a membership change message to remaining
3 members of the group.

1 14. A computer-implemented method for notifying jobs that form a group in a clustered
2 computing environment when a member of the group is no longer alive, the method
3 comprising the steps of:

4 defining a protocol that includes at least one acknowledge (ACK) round, and that
5 performs only local processing between ACK rounds;

6 providing a cluster engine for each member of the group that communicates with
7 the other cluster engines in the group;

8 providing at least one work thread for each job that executes at least a portion of
9 the protocol;

10 providing a main thread for each job, the main thread performing the steps of:

11 registering with the cluster engine to become a member of the group;

12 receiving messages from other members of the group via the cluster engine
13 corresponding to the main thread;

14 routing appropriate messages from the other members of the group to the
15 at least one work thread;

16 wherein the main thread performs only local processing and does not wait
17 for any local resource, and thus is guaranteed to receive a message sent by the
18 cluster engine;

19 unregistering with the cluster engine when at least one fault occurs during
20 execution of the protocol.

1 15. The method of claim 14 wherein the step of unregistering with the cluster engine
2 causes the cluster engine to generate a membership change message to remaining
3 members of the group.

1 16. A program product comprising:
2 (A) a computer program comprising:
3 at least one work thread that performs at least one predefined task; and
4 a main thread that receives messages from a corresponding cluster engine,
5 that routes appropriate messages from the cluster engine to the at least one work
6 thread, and that signals to the cluster engine when at least one fault occurs when
7 the at least one work thread performs the at least one predefined task; and
8 (B) signal bearing media bearing the computer program.

1 17. The program product of claim 16 wherein the signal bearing media comprises
2 recordable media.

1 18. The program product of claim 16 wherein the signal bearing media comprises
2 transmission media.

1 19. The program product of claim 16 wherein the at least one predefined task comprises
2 a protocol that includes at least one acknowledge (ACK) round, and that performs only
3 local processing between ACK rounds.

1 20. The program product of claim 16 wherein the main thread performs only local
2 processing.

1 21. The program product of claim 16 wherein the main thread does not wait for any local
2 resource, and thus is guaranteed to receive a message sent by the cluster engine.

1 22. The program product of claim 16 wherein the signal to the cluster engine comprises
2 an unregistration with the cluster engine

1 23. The program product of claim 22 wherein the unregistration with the cluster engine
2 causes the cluster engine to generate a membership change message.

1 24. A program product comprising:

2 (A) a computer program comprising:

3 at least one work thread that performs a predefined protocol that
4 includes at least one acknowledge (ACK) round, wherein the protocol only
5 performs local tasks between ACK rounds; and

6 a main thread that registers with the cluster engine to become a
7 member of a group, that receives messages from at least one computer
8 system coupled to the apparatus, that routes appropriate messages from the
9 at least one computer system to the at least one work thread, and that
10 signals to the cluster engine when at least one fault occurs when the at
11 least one work thread performs the at least one predefined task by
12 unregistering with the cluster engine, wherein unregistering with the
13 cluster engine causes the cluster engine to generate a membership change
14 to remaining members of the group; and

15 (B) signal bearing media bearing the computer program.

1 25. The program product of claim 24 wherein the signal bearing media comprises
2 recordable media.

1 26. The program product of claim 24 wherein the signal bearing media comprises
2 transmission media.